SEQUENCE LISTING

<110> Murphy, Brian R.
       Collins, Peter L.
       Schmidt, Alexander C.
       Durbin, Anna P.
       Skiadopoulos, Mario H.
       Tao, Tao

<120> USE OF RECOMBINANT PARAINFLUENZA VIRUSES (PIVs) AS
      VECTORS TO PROTECT AGAINST INFECTION AND DISEASE CAUSED
      BY PIV AND OHTER HUMAN PATHOGENS

<130> 15280-404100US

<140>
<141>

<150> 60/170,195
<151> 1999-12-10

<160> 62

<170> PatentIn Ver. 2.1

<210> 1
<211> 41
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
      sequence of Measles HA gene insert for N-P and P-M
      junctions

<400> 1
cttaagaata tacaaataag aaaaacttag gattaaagag cg   42

<210> 2
<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
      sequence of Measles HA gene insert for N-P and P-M
      junctions

1

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<400> 2
gatccaacaa agaaacgaca ccgaacaaac cttaag                          36


<210> 3
<211> 101
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
      sequence of Measles HA gene insert for HN-L
      junction

<400> 3
aggcctaaaa gggaaatata aaaaacttag gagtaaagtt acgcaatcca actctactca 60
tataattgag gaaggaccca atagacaaat ccaaattcga g                    101


<210> 4
<211> 79
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
      sequence of Measles HA gene insert for HN-L
      junction.

<400> 4
tcataattaa ccataatatg catcaatcta tctataatac aagtatatga taagtaatca 60
gcaatcagac aataggcct                                             79


<210> 5
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<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Cloning site
      for GU insertion

<400> 5
aggaaaaggg aaatataaaa aacttaggag taaagttacg cgtgttaact tcgaagagct 60
ccct                                                             64
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<210> 6
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Cloning site
      for NCR insertion

<400> 6
aggaaaaggg aacgcgtgtt aacttcgaag agctccct                              38


<210> 7
<211> 63
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Cloning site
      for supernumerary gene insert between the P and M
      genes of rHPIV3

<400> 7
ttaacaatat acaaataaga aaaacttagg attaaagagc catggcgtac gaagcttacg 60
cgt                                                                    63


<210> 8
<211> 12
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: PIV3 gene end
      (GE) sequence

<400> 8
aagtaagaaa aa                                                          12


<210> 9
<211> 58
<212> DNA
<213> Artificial Sequence

<220>
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<220>
<223> Description of Artificial Sequence: Cloning site
      for RSV G and F gene inserts in B/H PIV3

<400> 9
aggattaaag aactttaccg aaaggtaagg ggaaagaaat cctaagagct tagcgatg   58

<210> 10
<211> 11
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
      sequence for RSV G gene insert in B/H PIV3

<400> 10
gcttagcgat g   11

<210> 11
<211> 15
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
      sequence of RSV G and F gene inserts in B/H PIV3

<400> 11
aagctagcgc ttagc   15

<210> 12
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Flanking
      sequence for RSV F gene insert in B/H PIV3

<400> 12
gcttagcaaa aagctagcac aatg   24

<210> 13
<211> 83

<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
      for PCR of measles HA gene insert for N-P and P-M
      junctions

<400> 13
ttaatcttaa gaatatacaa ataagaaaaa cttaggatta aagagcgatg tcaccacaac 60
gagaccggat aaatgccttc tac   83

<210> 14
<211> 67
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
      for PCR of measles HA gene insert for N-P and P-M
      junctions

<400> 14
attattgctt aaggtttgtt cggtgtcgtt tctttgttgg atcctatctg cgattggttc 60
catcttc   67

<210> 15
<211> 55
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
      for PCR of measles HA gene insert for HN-L
      junction

<400> 15
gacaataggc ctaaaaggga aatataaaaa acttaggagt aaagttacgc aatcc   55

<210> 16
<211> 68
<212> DNA
<213> Artificial Sequence

<220>

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<223> Description of Artificial Sequence:
      Reverse/Forward primer for PCR of measles HA gene
      insert for HN-L junction

<400> 16
gtagaacgcg tttatccggt ctcgttgtgg tgacatctcg aatttggatt tgtctattgg 60
gtccttcc   68

<210> 17
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
      for PCR of measles HA gene insert for HN-L
      junction

<400> 17
ccatgtaatt gaatcccca acactagc   28

<210> 18
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:
      Forward/Reverse primer for PCR of measles HA gene
      insert for HN-L junction

<400> 18
cggataaacg cgttctacaa agataacc   28

<210> 19
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Upstream HPIV2
      HN primer

<400> 19
gggccatgga agattacagc aat   23

6

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<210> 20
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Downstream
      HPIV2 HN primer

<400> 20
cataagctt aaagcattag ttccc                                           25


<210> 21
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Upstream HPIV2
      HN primer

<400> 21
gcgatgggcc cgaggaagga cccaatagac a                                   31


<210> 22
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Downstream
      HPIV2 HN primer

<400> 22
cccgggtcct gatttcccga gcacgctttg                                     30


<210> 23
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: HPIV1 HN
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primer

<400> 23
agtggctaat tgcattgcat ccacat   26

<210> 24
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: HPIV1 HN
      primer

<400> 24
gccgtctgca tggtgaatag caat   24

<210> 25
<211> 13
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligomer
      insert for rule-of-six conformity

<400> 25
cgcggcaggc ctg   13

<210> 26
<211> 14
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligomer
      insert for rule-of-six conformity

<400> 26
cgcggcgagg cctg   14

<210> 27
<211> 15
<212> DNA

<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligomer
      insert for rule-of-six conformity

<400> 27
cgcgaggcct ccgcg   15

<210> 28
<211> 16
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligomer
      insert for rule-of-six conformity

<400> 28
cgcgccgcgg aggcct   16

<210> 29
<211> 17
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Oligomer
      insert for rule-of-six conformity

<400> 29
cgcgcccgcg gaggcct   17

<210> 30
<211> 42
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
      for RSV A G gene insert

<400> 30
aattcgctta gcgatgtcca aaaacaagga ccaacgcacc gc   42

9

<210> 31
<211> 92
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
     for RSV A G gene insert

<400> 31
aaaaagctaa gcgctagcct ttaatcctaa gttttctta cttttttac tactggcgtg   60
gtgtgttggg tggagatgaa ggttgtgatg gg   92

<210> 32
<211> 65
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
     for RSV A F gene insert

<400> 32
aaaggcctgc ttagcaaaaa gctagcacaa tggagttgct aatcctcaaa gcaaatgcaa   60
ttacc   65

<210> 33
<211> 89
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
     for RSV A G gene insert

<400> 33
aaaagctaag cgctagcttc tttaatccta agttttctt acttttatta gttactaaat   60
gcaatattat ttataccact cagttgatc   89

<210> 34
<211> 44
<212> DNA
<213> Artificial Sequence

10

<220>
<223> Description of Artificial Sequence: Mutagenic
      forward primer for modification of rHPIV3-1 cDNA

<400> 34
cggccgtgac gcgtctccgc accggtgtat taagccgaag caaa   44

<210> 35
<211> 59
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Mutagenic
      reverse primer for modification of rHPIV3-1 cDNA

<400> 35
cccgagcacg ctttgctcct aagttttta tatttcccgt acgtctattg tctgattgc   59

<210> 36
<211> 95
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
      for insertion of HPIV2 F ORF into rB/HPIV3 genome

<400> 36
aaaatatagc ggccgcaagt aagaaaaact taggattaaa ggcggatgga tcacctgcat 60
ccaatgatag tatgcatttt tgttatgtac actgg   95

<210> 37
<211> 72
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
      for insertion of HPIV2 F ORF into rB/HPIV3 genome

<400> 37
aaaatatagc ggccgctttt actaagatat cccatatatg tttccatgat tgttcttgga 60
aaagacggca gg   72

11

<210> 38
<211> 81
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Forward primer
      for insertion of HPIV2 HN ORF into rB/HPIV3 genome

<400> 38
ggaaaggcgc gccaaagtaa gaaaaactta ggattaaagg cggatggaag attacagcaa 60
tctatctctt aaatcaattc c   81

<210> 39
<211> 54
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Reverse primer
      for insertion of HPIV2 HN ORF into rB/HPIV3 genome

<400> 39
ggaaaggcgc gccaaaatta aagcattagt tcccttaaaa atggtattat ttgg   54

<210> 40
<211> 25
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 F
      (sense)

<400> 40
gtaccatgga tcacctgcat ccaat   25

<210> 41
<211> 31
<212> DNA
<213> Artificial Sequence

<220>

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<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 F
      (antisense)

<400> 41
tgtggatcct aagatatccc atatatgttt c   31

<210> 42
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 F
      (sense)

<400> 42
atgcatcacc tgcatccaat   20

<210> 43
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2
      (antisense)

<400> 43
tagtgaataa agtgtcttgg ct   22

<210> 44
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 HN
      (sense)

<400> 44
catgagataa ttcatcttga tgtt   24

13

<210> 45
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 HN
      (antisense)

<400> 45
agcttaaagc attagttccc ttaa   24

<210> 46
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 F
      (sense)

<400> 46
atcataatta ttttgataat gatcatta   28

<210> 47
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 F
      (antisense)

<400> 47
gttcagtgct tgttgtgtt   19

<210> 48
<211> 27
<212> DNA
<213> Artificial Sequence

14

<220>
<223> Description of Artificial Sequence: Primer for
     construction of PIV3-2 chimeric cDNAs, PIV3 HN
     (sense/antisense)

<400> 48
tcataattaa ccataatatg catcaat   27

<210> 49
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
     construction of PIV3-2 chimeric cDNAs, PIV3 HN
     (sense)

<400> 49
gatggaatta attagcacta tgat   24

<210> 50
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
     construction of PIV3-2 chimeric cDNAs, PIV2 F
     (antisense)

<400> 50
atgcatcacc tgcatccaat   20

<210> 51
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
     construction of PIV3-2 chimeric cDNAs, PIV2 F
     (sense)

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<400> 51
gatgatgtag gcaatcagc                                                    19


<210> 52
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 HN
      (sense)

<400> 52
actgccacaa ttcttggc                                                     18


<210> 53
<211> 26
<212> DNA
<213> Artificial Sequence


<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 HN
      (antisense)

<400> 53
ttaaagcatt agttccctta aaaatg                                            26


<210> 54
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 F
      (sense)

<400> 54
aagtattaca gaattcaaaa gag                                               23


<210> 55
<211> 20
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<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 HN
      (antisense)

<400> 55
cttattagtg agcttgttgc   20

<210> 56
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 F
      (sense)

<400> 56
accgcagctg tagcaatagt   20

<210> 57
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV2 HN
      (antisense)

<400> 57
gattccatca cttaggtaaa t   21

<210> 58
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 M

17

<400> 58
gatactatcc taatattatt gc   22

<210> 59
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Primer for
      construction of PIV3-2 chimeric cDNAs, PIV3 L
      (antisense)

<400> 59
gctaattttg atagcacatt   20

<210> 60
<211> 15492
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Sequence of
      pFLC.PIV32, 15492 bp in sense orientation

<400> 60
accaaacaag agaagaaact tgtctgggaa tataaattta actttaaatt aacttaggat 60
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18

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19

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23

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26

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27

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29

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31

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33

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34

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